

Having, thus, described the invention, what is claimed is:

1 1. An apparatus for placing a circular end cap on a cylindrical workpiece, comprising:
2 a stationary support base;
3 a guide member which is fixedly attached to the stationary support base and which
4 comprises a ramp;
5 a movable push bar;
6 a spacer which is operatively attached to said push bar for concurrent movement
7 therewith;
8 an emplacement applicator, comprising:
9 a back plate, having an upper part and a lower part having a post operatively
10 attached thereto, said post being disposed proximate said ramp;
11 a flange affixed to the lower part of said applicator back plate, said flange
12 being pivotally attached to said spacer at a pivot connection;
13 said emplacement applicator further comprising an end cap clamping jig operatively
14 attached to the upper part of said applicator plate;
15 wherein linear inward movement of said push bar, from a first position to a second
16 position, moves the post up the ramp, causing said applicator plate to pivotally move around
17 said pivot connection, from a substantially horizontal orientation to a substantially vertical
18 orientation thereof.

1 2. The apparatus of claim 1, wherein said end cap gripping jig comprises a plurality of



2 arcuate segments which cooperate to form a circular hollow therebetween, when placed in
3 end-to-end contact with one another;
4 wherein each of said arcuate segments is radially reciprocally movable with respect to
5 said circular hollow.

1 3. The apparatus of claim 2, wherein each of said arcuate segments has a groove
2 formed in an inner surface thereof, to receive an end cap edge portion.

1 4. The apparatus of claim 2, wherein said arcuate segments are provided with tapered
2 inner edges, for forcing a circumferential edge of a workpiece inwardly as the segments are
3 forced therepast.
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

1 5. The apparatus of claim 2, wherein said end cap clamping jig comprises at least
2 three segments.

1 6. The apparatus of claim 1, further comprising a servo motor for moving said push
2 bar.

1 7. The apparatus of claim 1, wherein said guide member comprises a first upstanding
2 guide plate, attached to the stationary support member and having a first guide groove
3 formed therein.

1 8. The apparatus of claim 7, wherein said first guide groove comprises a substantially

2 horizontal first section, a second section which extends upwardly at an angle from said first
3 section and which defines said ramp therebelow, and a substantially horizontal third section.

1 9. The apparatus of claim 7, wherein said guide member comprises a second
2 upstanding guide plate, attached to the stationary support member and having a second guide
3 groove formed therein and facing toward the first guide groove.

1 10. The apparatus of claim 1, wherein said emplacement applicator comprises a drive
2 plate for connecting to said push bar, and wherein said spacer is affixed to said drive plate.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

11. The apparatus of claim 1, wherein said gripping jig is adapted to be
pneumatically actuated.

12. The apparatus of claim 6, further comprising a threaded shaft attached to said
servo motor, and wherein said push bar is threadably connected to said threaded shaft for
movement thereby.

1 13. An end cap installation station, comprising a first placement apparatus which is
2 the apparatus of claim 1, the first placement apparatus constructed and arranged to have a
3 push bar thereof move in a first direction during placement of an end cap on a workpiece;
4 said end cap installation station further comprising a second placement apparatus
5 which is substantially identical to the first placement apparatus and oriented to substantially
6 mirror said first placement apparatus,

7 wherein said first and second placement apparatus share a common stationary support
8 member, and wherein said second placement apparatus is configured, constructed and
9 arranged to have a push bar thereof move in a second direction during placement of an end
10 cap on a workpiece,

11 wherein said second direction is substantially opposite said first direction.

1 14. A method of applying an end cap to a cylindrical filter element having a
2 longitudinal axis, comprising the steps of:
3 a) supporting a cylindrical filter element at a central portion thereof;
4 b) grasping a first end cap with a clamping jig of a first end cap application apparatus,
5 said application apparatus comprising a back plate;
6 c) positioning the filter element adjacent said end cap application apparatus; and
7 d) pivotally moving said applicator back plate around a pivot connection, causing said
8 plate to move from a substantially horizontal orientation to a substantially vertical orientation
9 thereof, to force said end cap in covering relation over a first end of said filter element.
10
11

1 15. The method of claim 14, further comprising a step of applying a second end cap to
2 a second end of said filter element with a second end cap application apparatus which is
3 substantially similar to said first end cap application apparatus.

1 16. The method of claim 15, wherein both end caps are simultaneously applied to said
2 filter element.

1 17. The method of claim 14, wherein each of the arcuate segments of the end cap
2 clamping member comprises a tapered edge on an inner surface thereof, and wherein said
3 tapered edge forces a circumferential outer edge of a filter element inwardly during step d) as
4 said tapered edge is moved past said filter element outer edge.

1 18. The method of claim 14, wherein said end cap applicator apparatus comprises a
2 flange attached to a lower part of said back plate and a cam follower bearing attached to said
3 flange and extending outwardly thereon, and wherein said cam follower bearing is moved up
4 a ramp during step d).

10037608-110701